

"Translation of Amended Pages ("Druckexemplar")"

Replacement Page 1, 1st Paragraph

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Method and Device for Exchanging Shears in the Cutting to Length  
of Strips or Sheets in the Rolling or Transport Line

BACKGROUND OF THE INVENTION

C1 The invention relates to a method for exchanging shears in the cutting to length of strips or sheet metal in a rolling or transport line, in particular, on a rolling table, with blade holders, one being positioned above and one being positioned below the strip, which blade holders are guided by means of holding elements. The invention also relates to a device for performing the method.

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Text Insertion between Last and Second to Last Paragraphs  
of Page 2

U.S. 3,561,311 describes a shearing device with a pair of hollow shafts for receiving axially movable rods with a cutting blade attached thereto that can be positioned within a blade drum rotatable with the hollow shaft. Usually, the blades are secured in a locking position. When the rods are moved by a selective displacement, the blades are moved toward each other to carry out a cutting or shearing action for rolled material passing between the blade drums. After each cut, the shearing blades are retracted into a rest position by brake means in order to prevent continued movement of the blades.

C<sup>2</sup> U.S. 3,638,523 shows a shearing machine with interchangeable blade-holders wherein the blade holder can be laterally removed together with the blades from the machine. The movable and the stationary blade holders have adjustment wedges such that each wedge within the blade holder can independently adjust clearance at the blade holder slide guide and the clearance between the moveable and the stationary blades. In this way, an adjustment operation of the clearances after mounting of the blade holder is eliminated.

U.S. 3,895,549 discloses a method and device for cutting the leading and trailing ends of steel strip by means of two pairs of blades. The blades are mounted on the periphery of two drums. Each drum has a blade for the leading end and a blade for the trailing end. The blades are positioned such that the blade for the front end cut is positioned not more than 180 degrees behind the blade for the trailing end cut. The rollers are rotated in different

directions in order to be able to cut each end of the strip. As a result of this method, the ends of the strip can be improved significantly in order to achieve proper passing of the strip through the hot finishing rolling device. Also, the shearing device requires less energy.

C<sup>2</sup> U.S. 4,470,331 discloses a scroll-type slitting machine having upper and lower arbors, each having a plurality of mating rotary cutting members. A movable housing rotatably supports first ends of the upper and lower arbors. A fixed housing rotatably supports opposite ends of the upper and lower arbors. A mechanism for vertically adjusting the arbors relative to the other is provided. A pinion stand is mounted external and adjacent to one of the housings. Upper and lower intermeshing, synchronizing gears are rotatably mounted within the pinion stand. Upper and lower torque-transmitting couplings extend between and operatively join the upper and lower synchronizing gears to the upper and lower arbors, respectively. They permit relative movement between the arbors.

U.S. 4,507,994 describes a device for monitoring the tractive force generated by a cylinder-piston assembly on a member to be moved thereby. The device has a spring that is mounted between the cylinder assembly and the member to be moved such that the force generated by the cylinder-piston assembly is transmitted to the spring for moving a first portion relative to a second portion thereof. An actuatable switch has a first switching element mounted for movement with the first portion of the spring and a second switching element fixedly mounted to the second portion of the spring. The two switching elements actuate the switch when a predetermined path of travel of the first portion of the spring is exceeded.

C<sup>2</sup> U.S. 4,608,895 discloses a pair of rotary dies with lands having coacting cutting edges which cut blanks of material from a web passing between the rotating dies. To provide a clean cut and improved squareness of the cut ends, a side face of the land adjacent the cutting edge has a positive rake. To ensure that the cutting edges can be brought into coacting relationship to produce a clean cut, they are located and arranged on the dies so that they can be varied and adjusted axially and in rotary phase relative to each other. A die stand for positioning, adjusting and driving the rotary dies is provided. A method for making negative electrode cylinders for producing the rotary dies by hardening, grinding and electric discharge machining blank cylinders of tool steel, is also disclosed.

U.S. 4,922,778 describes an apparatus for cutting metal sheet wherein a pair of hollow shafts are mounted in a housing for angular movement relative thereto. The hollow shafts have hollow bores whose axes are eccentric to the axes of the hollow shafts, respectively. A pair of holder shafts are rotatably fitted in the hollow bores, respectively. A pair of circular cutting blades are concentrically mounted on projecting forward ends of the holder shafts, respectively, for rotation with the hollow shafts. When the holder shafts are rotated to rotate the cutter blades, the cutter blades cooperate with each other to cut a metal sheet passing between the cutter blades.

U.S. 5,363,731 describes an apparatus for regulating and adjusting powered rolls for conveying metal plates supported in tubular crossbeams that is always reliable in operation and provided with a simple configuration protection from rust deposits. The apparatus is suitable especially for shears for edge trimming and/or for longitudinal or transverse division of the plates. The apparatus

has regulation elements as wedges which are displaceably arranged within a bearing bracket and are in operational connection with the adjustment elements.

C<sup>2</sup> U.S. 5,673,603 shows a device for cutting to shape advancing material webs made of fibrous materials. The device has a rotatingly driven shape cutting roller and a rotatingly driven counter cutting roller. The shape cutting roller has a shape cutting edge and the counter cutting roller a smooth cylinder surface. Both rollers are mounted in a machine frame by means of pivot bearings, and the distance between the axes of the rollers is adjustable. One of these machine frame parts is held on an adjustable wedge-shaped guide for adjusting the distance between the axes of the rollers.

U.S. 6,026,722 discloses a device for cutting electric battery plates and has two rollers, between which a metal strip passes. The metal strip has a row of holes running down the center, separated by bridges. The lower roller is provided with means for removing cut-away pieces. A disk is mounted on the lower roller. Lugs project radially from the disk to pull the strip along. Cutter plates are mounted on the upper roller. The cutter plates are provided with blades that cut the strip and the bridges transversely to yield plates with their respective tabs. Inserts are provided under the cutter plates.

U.S. 2001/0020407 A1 describes a high-speed shearing arrangement for transversely cutting rolled strip with knife carriers that can be driven in rotation and are arranged in pairs opposite each other. The knife carriers are arranged with a fixed distance between them on both sides of the strip in a common shear cassette.

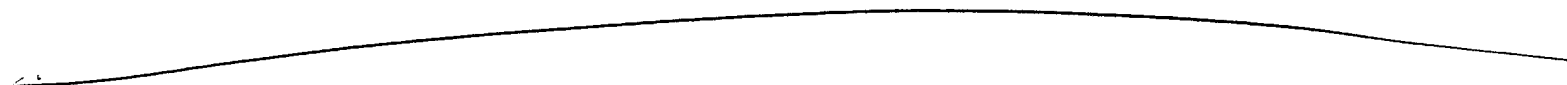
The shear cassette is mounted within an outer frame and is provided with a lifting device for raising or lowering it within the outer frame. In a method for operating the shearing arrangement, the two knife carriers are moved into a horizontal position for allowing the strip end to enter or travel through, and the shear cassette is moved within the outer frame into a raised transfer position.

C2  
U.S. 6,295,909 discloses an apparatus for cutting metal sheet having two rotatable drums, wherein the metal sheet passes between the drums for cutting. Each of the drums has a cutting blade moved into and out of cutting position by an axial actuator rod. The cutting blade has two sets of rollers bearing against one of a pair of profiled side surfaces of the axial actuator rod.

U.S. 6,370,998 discloses upper and lower rotating drums having shearing blades that are supported by a bearing frame via eccentric sleeves. Only the upper rotating drum is rotated by a drive motor, while the eccentric sleeves are rotated by a drive motor, so that the rotating drums can approach one another and move away from each other. Interlocking gears are fixed to shaft end portions of the rotating drums to permit interlocking of the rotating drums when these drums approach. Oldham's couplings are interposed between the interlocking gears and timing gears to rotate the rotating drums constantly and synchronously.

German patent document 1 436 909 describes a machine for cutting, upsetting or similar processing steps of web material sheet material, in particular, for use in connection with corrugated cardboard where the material is supplied continuously to the processing tools. The machine is provided with at least two different adjustable sets of rotating tools, such as cutting or upsetting tools, and with a device provided with a pressure medium

c<sup>2</sup> cylinder which moves the first tool set into a working position and the other into a rest position, respectively. The tool sets, before they reach their working position, are already rotated at the desired rotational speed.



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Replacement Page 3, 1st Paragraph

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SUMMARY OF THE INVENTION

C 3  
In a method of the aforementioned kind the object is solved in that the shears can be moved together with the blade holders and with their holding elements after each cut out of the rolling line to the side into a neutral waiting position, while the strip or sheet metal is in the rolling or transport line, and that, before moving out the shears, the forward connection between the blade holders or between the holding elements overlapping the rolling line is opened, and that the shears for a subsequent cut are moved into the rolling line so as to overlap it in a U-shape, and that the forward connection is closed and, by employing a clamping element, is coupled positively and non-positively before a subsequent cut, wherein, when moving the shears into the rolling or transport line, a part of the rolling table is moved out of the rolling or transport line to the side and, simultaneously with moving the shears out of the rolling or transport line into the waiting position, the part of the rolling table is again moved into the rolling table ~~with the characterizing features of claim 1.~~

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"Translation of Amended Pages ("Druckexemplar")"

Replacement Page 5, 1st Paragraph

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BRIEF DESCRIPTION OF THE DRAWINGS

C4 Details, features, and advantages of the invention result from the subsequent explanation of an embodiment schematically illustrated in the drawings. It is shown in:

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Literal Translation of WO 00/05019 (PCT/EP99/05115)  
Replacement Page 5, 1st through 3rd Paragraphs

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Fig. 6 in a front view the shears with the foldable clamping element according to Fig. 5.

DESCRIPTION OF PREFERRED EMBODIMENTS

c4' The device illustrated in Fig. 1 for cutting to length strips 1 or sheet metal in the rolling line x-x, in particular, on a rolling table 2, shows the shears 3 in a position shortly before performing a cut, with arms 22, 29 of its machine frame 20 still open. The shears 3 have a drive apparatus 8 with reducing gear 8' as well as a synchronization gear 12 flanged onto the frame 20. The shears 3 are moveable, inclusive of its drive apparatus, by means of a drive 10 and a drive carriage 9 guided on rails transverse to the rolling or transport line x-x. The drive carriage 9 is coupled with a movable part 2' of the rolling table 2 and is moved together with the shears 3 such that it is positioned external to the rolling line x-x when the shears 3, as illustrated in Fig. 1, are positioned in the rolling line x-x and, conversely, is rejoined again with the rolling table 2 when the shears 3 are moved out.

As also illustrated in Fig. 1, at the rolling table side at least one clamping element 7 with actuating members 11, 25, 30, 36 is arranged. The actuating members in the present embodiment are hydraulic piston-cylinder units and are referred to as force means. On the rolling table side of the frame arms 22, 29, the holding elements 6, 6' overlapping the rolling line x-x are provided which receive bearings (not illustrated) for oppositely rotatable rotors of the blade holders 4, 4'. The transport plane of the rolling table 2 is identified at y-y.

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Literal Translation of WO 00/05019 (PCT/EP99/05115)  
Replacement Page 6, 2nd Paragraph

CS  
According to Fig. 2 and Fig. 3, a hydraulic force means 11 cooperating with coupling elements 21 and 21' is provided for lifting the clamping element 7 into the gliding paths 26, 26' or for lifting it out of it. Moreover, the Figs. 2 and 3 show that the holding element 6 has two pressure plates 23, 23' at the free end of the upper, horizontal frame arm 22, that the clamping element 7 has congruent gliding plates 24, 24', that the holding element 6' has two pressure plates 37, 37', and that the clamping element 7 has congruent gliding plates 38, 38'. The clamping element 7 is slidable by force means 25, 25' on a horizontal gliding path 26, 26' with its gliding plates 24, 24' and 38, 38' across the pressure plates 23, 23' and 37, 37' for generating a positive and non-positive coupling.

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Literal Translation of WO 00/05019 (PCT/EP99/05115)  
Replacement Page 6, Last Paragraph

C6 The coupling rods 32, 32' can be engaged via lower recesses 27, 27' and ~~39, 39'~~ by congruent coupling sockets 28, 28' and ~~40, 40'~~ of the lower frame arm 29 of the machine frame 20 and are adjustable by a force means 30. The coupling rods 32, 32' are moved with the aid of their spindle drives 31, 31' into the position in which the recesses 39, 39' rests against the coupling sockets 40, 40' for generating a positive and non-positive connection.

Literal Translation of WO 00/05019 (PCT/EP99/05115)  
Replacement Page 10

C7  
37, 37' pressure plates  
38, 38' gliding plates  
~~39, 39' recesses~~  
~~40, 40' coupling sockets~~

### List of Amended Claims

1. (currently amended) A method for exchanging shears (3) in the cutting to length of strips (1) or sheet metal in ~~the~~ a rolling or transport line (x-x), in particular, on a rolling table (2), with blade holders (4, 4'), one arranged above and one arranged below the strip (1), which blade holders are guided by ~~means of~~ holding elements (5, 5'; 6, 6'), wherein the shears (3) can be moved together with the blade holders (4, 4') and with their holding elements (5, 5'; 6, 6') after each cut out of the rolling line (x-x) to the side into a neutral waiting position, while the strip or sheet metal is in the rolling or transport line, and that, before moving out the shears 3, ~~the~~ a forward connection between the blade holders (4, 4') or between the holding elements (6, 6') overlapping the rolling line (x-x) is opened, and that the shears (3) for a subsequent cut are moved into the rolling line so as to overlap it in a U-shape, and that the forward connection is closed and, by employing a clamping element (7 or 32), is coupled positively and non-positively before a subsequent cut, wherein, when moving the shears (3) into the rolling or transport line (x-x), a part (2') of the rolling table (2) is moved out of the rolling or transport line (x-x) to the side and, simultaneously with moving the shears (3) out of the rolling or transport line (x-x) into the waiting position, the part (2') of the rolling table is again moved into the rolling table.
2. (currently amended) A device for exchanging shears (3) in the cutting to length of strips (1) or sheet metal in a rolling or transport line, in particular, on a rolling table (2), ~~for performing the method according to claim 1,~~ wherein the shears

(3), inclusive of the drive apparatus (8), are arranged on a rail-guided drive carriage (9) which, while the strip or sheet metal is positioned in the rolling or transport line, is movable by means of a drive (10) transverse to the rolling or transport line (x-x), wherein the shears (3) comprise a U-shaped frame (20) open toward the rolling or transport line (x-x) and closed at ~~the~~ a drive side, on which, at the drive side as well as ~~the~~ a rolling table side, holding elements (5, 5'; 6, 6') are provided ~~having bearings for that support~~ the blade holders (4, 4') ~~arranged therein~~, and wherein the drive carriage (9) is coupled with a movable part (2') of the rolling table (2).

- C 8
3. (previously amended) A device according to claim 2, wherein the drive carriage (9) at the rolling table side receives at least one clamping element (7) with actuating members (11, 25, 30, 36).
  4. (previously amended) A device according to claim 2, wherein the U-shaped open side of the frame (20) has correlated therewith a clamping element (7) coupling together the holding element (6, 6') at the rolling table side.
  5. (previously amended) A device according to claim 2, wherein the clamping element (7) is provided with coupling elements (21) for coupling with the holding elements (6, 6') of the frame arms (22, 29).
  6. (currently amended) A device according to claim 2, wherein the holding element (6) at ~~the~~ a free end of ~~the~~ an upper, horizontal frame arm (22) comprises at least one pressure plate (23, 23') and the clamping element (7) has

congruent gliding plates (24, 24' and 38, 38') for overlapping them, and that the clamping element (7) is movable by force means (25, 25') on a horizontal gliding path (26, 26') with its gliding plates (24, 24' and 38, 38') across the pressure plates (23, 23' and 37, 37) for generating a positive and non-positive coupling.

- C8
7. (withdrawn) A device according to claim 2, wherein the holding element (6) at the free end of the upper horizontal frame arm (22) is provided with threaded spindle coupling rods (32, 32') connected so as to be pivotable to both sides, which, by means of recesses (27, 27' and 39, 39'), are engageable in congruent coupling sockets (28, 28') of the lower frame arm (29) or in the congruent coupling sockets (40, 40') of the upper holding element (6) and adjustable by a force means (30) for generating a positive and non-positive connection with the aid of their spindle drives (31, 31').
8. (withdrawn) A device according to claim 2, wherein the clamping element (7) correlated transversely to the frame arms (22, 29) can be folded upwardly by means of a joint (34) with a pivot axis (35) extending parallel to the rolling line with the aid of at least one force means (36) for coupling of the two frame arms (22, 29) or folded down for releasing the coupling of the frame arms.
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